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THE ICHTHYOFAUNAL DIVERSITY ACROSS KRISHNA RIVER IN GUGAL OF DEODURGA TALUK, RAICHUR DISTRICT, KARNATAKA, INDIA

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ABSTRACT

Icthyofaunal diversity of species across the Krishna River in Gugal of Deodurga taluk Raichur district was studied from January 2016 to December2017. A total number of thirty six species belonging to nine orders and eleven families were recorded during the study period. The order Cypriniformes was dominant with fourteen (14) followed by order Siluriformes nine (9), Perciformes five (5), Anabantiformes three (3), Beloniformes, Gobiifomes, Cichiofrmes, Synbranchiformes and Osteoglossiformes each with one species. The study also shows that the river is mostly stressed due to anthropogenic activities and over exploitation of fishes throughout the year. It also suggests that some urgent steps and awareness programmes are needed to educate people about the importance of the Krishna River, its biodiversity and fish productivity in the future.

KEYWORDS: Gugal Barrage/Bridge, Krishna River & Ichtahyofaunal Diversity

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INTRODUCTION

The aquatic ecosystem is important and it has a large number of economically important animals, especially fish which is an important source of food. (Das *et al.*, 2007) mentioned that there are 14 major rivers in India viz. Ganga. Brahmaputm, Brahmnni, Cauvery, Godavari, Indus, Krishna, Mahanadi, Mahi, Narmada, Periyar, Sabarmati, Suharnarekha, Tapti, covering 83% of the drainage basin and account for 85% of the surface flow.

Laxmappa et al., (2015) mentioned that the Krishna is one of the longest rivers of India and flows about 1400 km in length. It originates at Mahabaleshwar in Maharashtra, flows through the states of Maharashtra, Karnataka, Telangana and Andhra Pradesh and meets the sea in the Bay of Bengal. Krishna, like the Godavari and Cauvery flows almost across southern India from West to East. Though the latter two rivers are venerated to a greater extent than Krishna, in respect of the area of its drainage including its two great tributaries the Bhima and the Thungabhadra, it is the largest of the three. The Krishna River is a boon for all these three states and has made possible remarkable agricultural and industrial development. Moreover, it provides food and shelter to a large number of aquatic fauna.

India, being a mega-diverse country, harbours 197 species of catfish (Jayaram, 2009). In recent years much interest has developed in the study of the phylogeny and taxonomy of the order Siluriformes as a whole (Jayaram,

2009). A lot of information has been accumulated in the field of diversity, density, threats and conservation of fresh water fish fauna of the Krishna River system (Arunachalam 2000; Khart *et al.* 2003, 2012; Dahanukar *et al.* 2004, 2012, Chandanshive *et al.* 2007, Sarwade and Khillare 2010, Vijaylaxmi *et al.* 2010; Jadhav *et al.* 2011).

Therefore in the present study an attempt has been made to highlight the ichthyofaunal diversity of Krishna river of Gugal bridge/Barrage of the Deodurga taluk, Raichur district. The work will provide future strategies for development of fish species conservation.

MATERIALS AND METHODS

Study Area

Gugal is village in the Deodurga taluk of Raichur district in Karnataka state, India. Gugla is located on the banks of the Krishna River. Gugal is famous for its cave temple dedicated to Sriallamaprabhu. Gugal is 50km from district headquarters Raichur and lies in northwest direction (Figure 1).

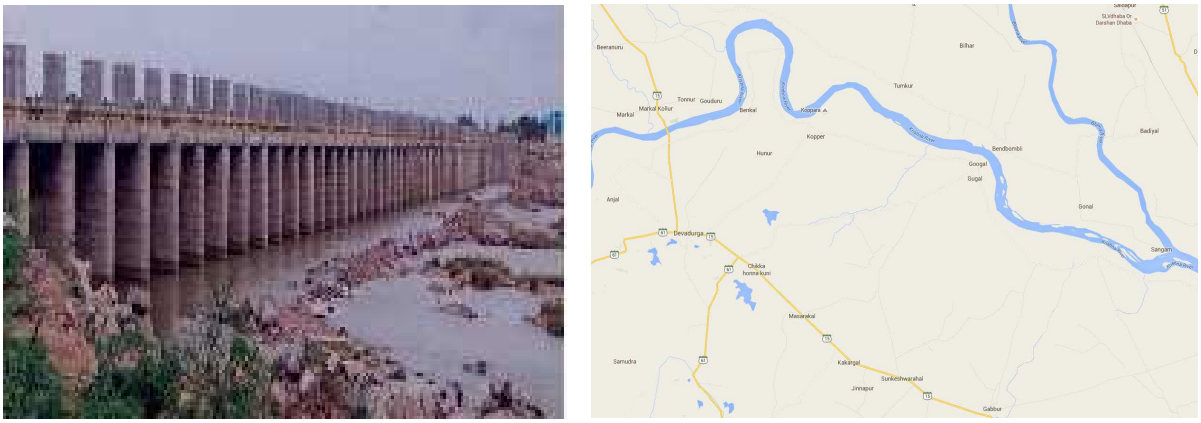

Figure 1: Bird Eye View of Study Area

Sampling

The present work is an attempt to study the Icthyofaunal diversity of Gugal Bridge cum barrage across the Krishna river. Fishes were collected from different selected localities with the help of local fisherman using different types of nets namely gill nets, castnets, dragnets, hook lines etc., fish samples were collected from the fisher man on spot, fish landing centers. Immediately photgraphs were taken prior of preservation with 10% formalin, since formalin decolorizes the fish colour on long preservation. Fishes brought to the laboratory and were fixed in formalin solution in separate jars according to size; small fishes were directly placed in formalin solution, while larger fishes were placed in buckets. The fishes collected and fixed were labelled.

Identification were done based on keys of fishes of the Indian subcontinent (Day, 1958, Jayram1981, 1999, Talwar and Jhingran 1991). The identification of the species was done mainly on the basis of the colour pattern, specific spots or marks on the surface of the body, shape of body structure of various fins etc.

Data Analysis

Fish species diversity was subjected to diversity analysis using different indices like Shannon – Weiner index (H) (1949); Simpson Dominance index (D); Simpson index of diversity (1- D) (Simpson, 1949); Pielous Evenness (Pielou, 1966); Margalef's index (Margalef, 1972).

Shannon – Weiner Index

$H = - \Sigma Pi \log2 Pi$

Where, H = Shannon – Weiner index

$Pi = ni / N$

Σ = Sum

ni = Number of individuals of each species in the sample.

N = Total number of individuals of all species in the sample.

Species richness was simply estimated by the variety of fish species in the study site. Data regarding threats faced by the fish fauna were obtained from both primary (direct observations and interaction with local stakeholders and fishermen) and secondary sources.

Simpson's Diversity Indices

Simpson's diversity index is a measure of diversity. It takes into account the number of species present, as well as the abundance of each species.

(a) Simpson's index of dominance

$D = \Sigma [ni (ni – 1) / N (N – 1)]$

Where, ni = The total number of individuals of a particular species.

N = The total number of individuals of all species.

(b) Simpson's index of diversity 1 – D

Pielou's Evenness

$J = H / \log2 S$

Where, 'H' is the Shannon Weiner index and 'S' is the number of species

Evenness is a measure of the relative abundance of the different species making up the richness of an area.

Margalef Index

$Ma = S – 1 / Ln N$

Where, 'S' is the number of species 'N' is the number of individuals in the sample.

The number of species per sample is a measure of richness. The more species present in a sample, the 'richer' the sample

RESULT AND DISCUSSIONS

In the present study of Ichthyofaunal diversity, a total number of thirty six species belonging to nine orders and eleven families were recorded during the study period. The order Cypriniformes was dominant with fourteen (14) followed

by order Siluriformes nine (9), Perciformes five (5), Anabantiformes three (3), Beloniformes, Gobiifomes, Cichiofrmes, Synbranchiformes and Osteoglossiformes each with one species. The fish catches in the study area during January 2016 to December 2017 are shown in (Table 1.)

Table 1: Fish Species Recorded in Study Area

Order	Family	Binomial Name	IUCN (8.1)
Cypriniformes	Cyprinidae	*Labeo rohita(F. Hamilton, 1822)*	LC
		Puntius sophore (F. Hamilton, 1822)	LC
		Cirrhinus cirrhosus (Bloch, 1795)	Vu
		Esomus danrica(F.Hamilton 1822)	LC
		Etroplus suratensis(Bloch 1790)	LC
		Puntius chola(F. Hamilton, 1822)	LC
		Cyprinus carpio Linnaeus, 1758	Vu
		Cirrhinus mrigala(Bloch 1795)	Vu
		Amblypharyngodon mola (F Hamilton1822)	LC
		Hypselobarbus thomassi (F. Day, 1874)	CE
		Systomus sarana (F. Hamilton, 1822)	LC
		Cirrhinus reba (Hamilton, 1822)	LC
		labeo baggat (Hamilton 1822)	LC
		Catla catla (F. Hamilton, 1822)	LC
Perciformes	Cichlidae	*Blue Oreochromis mossambicus (Peters 1852)*	NT
		Mozambique mouth brooder	NT
		Parambassis ranga (F. Hamilton, 1822)	LC
		Oreochromis mossambicus niloticus(peters 1852	NT
		Chanda nama(F hamilton 1822)	LC
Osteoglossiformes	Notopteridae	*Notopterus notopterus*	LC
Beloniformes	Belonidae	*Xenentodon cancila (F. Hamilton, 1822)*	LC
Gobiiformes	Gobiidae	*Glossogobius giuris(F. Hamilton, 1822)*	LC
Siluriformes	Siluridae	*Ompok bimaculatus(Bloch 1794)*	NT
		Wallago attu (Bloch & Schneider, 1801	NT
		Ompok pabda (Hamilton, 1822)	NT
	Bagridae	*Rita gogra (Sykes, 1839)*	LC
		Rita rita (F Hamilton 1822)	LC
		Sperata aor(F Hamilton 1822)	LC
		Sperata seenghala(sykes 1839)	LC
		Mystus gulio (Hamilton 1822)	LC
	Schilbeidae	*Eutropiichthys vacha (F Hamilton 1822)*	LC
Anabantiformes	Channidae	*Channa marulius(F Hamilton 1822)*	LC
		Channa striata (Bloch 1973)	LC
		Channa punctata (Bloch, 1973)	LC
Cichliformes	Cichlidae	*Oreochromis aureus (Steindachner, 1864)*	LC
Synbranchiformes	Mastacembelidae	*Mastacembelus armatus (lacepede 1800)*	LC

CR-Critically Endangered, **EN**-Endangered, **VU**-Vulnerable, **NT**-Near Threatened, **LC**-Least Concern

Order Cypriniformes includes fourteen species namely Labeo rohita, Punctius sophore, Cirrhinus cirrhosus, Esomus danricus, Etroplus suratensis, Puntius chola, Amblypharyngodon mola, Cyprinus carpio, Catla catla, Cirrhinus mrigala, Puntius lithopidas, Cirrhinus reba, Labeo baggat, Punctius sarana. Order Perciformes includes 5 species namely Mozambique mouthbrooder, Blue Oreochromis mossambicus, Parambassis ranga, Oreochromis mossambicus niloticus, Chanda nama. Order Siluriformes includes 9 species Ompok bimaculatus, Wallago atta, Ompak pabda, Rita gogra, Eutophiichthys vacha, Sperata aor. Sperata seenghala, Rita rita, Mystus gulio. Order Anabantiformes includes 3 species Channa marulius, Channa striata, Channa punctata. Order Oseteoglossiformes includes one species Notopterus notopterus. Order Beloniformes includes one species Xenentodon cancila. Order Gobiiformes includes one species Glossogobius

giuris. Order Cichliformes includes one species Blue Oreochromis aureus and Order Synbranchiformes includes one species Mastacembelus armatus.

The Cyprinidae family was found to be the most dominant group among all the other families. The results are in accordance with those of (Wakid and Biswas, 2005; Bhat, 2003; Shahnawaz *et al.,* 2009). (Table 2) shows the species density and abundance.

Table 2: List and Abundance of Fish Fauna Recorded from the Study Area

Order	Family	Binomial Name	Abundance
Cypriniformes	Cyprinidae	*Labeo rohita(F. Hamilton, 1822)*	18
		Puntius sophore (F. Hamilton, 1822)	15
		Cirrhinus cirrhosus (Bloch, 1795)	15
		Esomus danrica(F.Hamilton 1822)	10
		Etroplus suratensis(Bloch 1790)	01
		Puntius chola(F. Hamilton, 1822)	03
		Cyprinus carpio Linnaeus, 1758	21
		Cirrhinus mrigala(Bloch 1795)	12
		Amblypharyngodon mola (F Hamilton1822)	04
		Puntius lithopidos (F. Day, 1874)	08
		Puntius sarana (F. Hamilton, 1822)	08
		Cirrhinus reba (Hamilton, 1822)	01
		labeo baggat (Hamilton 1822)	25
		Catla catla (F. Hamilton, 1822)	13
Perciformes	Cichlidae	*Blue Oreochromis mossambicus (Peters 1852)*	12
		Mozambique mouth brooder	01
		Parambassis ranga (F. Hamilton, 1822)	02
		Oreochromis mossambicus niloticus(peters 1852	15
		Chanda nama(F hamilton 1822)	13
Osteoglossiformes	Notopteridae	*Notopterus notopterus*	23
Beloniformes	Belonidae	*Xenentodon cancila (F. Hamilton, 1822)*	10
Gobiiformes	Gobiidae	*Glossogobius giuris(F. Hamilton, 1822)*	01
Siluriformes	Siluridae	*Ompok bimaculatus(Bloch 1794)*	08
		Wallago attu (Bloch & Schneider, 1801	15
		Ompok pabda (Hamilton, 1822)	18
	Bagridae	*Rita gogra (Sykes, 1839)*	06
		Rita rita (F Hamilton 1822)	04
		Sperata aor(F Hamilton 1822)	12
		Sperata seenghala(sykes 1839)	14
		Mystus gulio (Hamilton 1822)	13
	Schilbeidae	*Eutropiichthys vacha (F Hamilton 1822)*	01
Anabantiformes	Channidae	*Channa marulius(F Hamilton 1822)*	11
		Channa striata (Bloch 1973)	24
		Channa punctata (Bloch, 1973)	19
Cichliformes	Cichlidae	*Oreochromis aureus (Steindachner, 1864)*	03
Synbranchiformes	Mastacembelidae	*Mastacembelus armatus (lacepede 1800)*	15

The diversity of fish has been studied by various researchers in the country, our results matches with some of the research, 29 species fresh water fishes from Bheem river, Gulbarga district, Karnataka (C. Vijaylaxmi and k. Vijaykumar, 2011), (Shaikh H M *et. al.,* 2011) 33 species in the Gour river of Jabalpur district, Madhya Pradesh ; 26 species in the Godavari River at Mudgal Taluq of Pathri district (Jaiswal D. P. and Ahirrao K. D. 2012); 37 freshwater and 62 species in the Kuttanad River in Kerala, India (Kharat Sanjay *et. al.,* 2012)., Few studies are available on diversity and conservation of freshwater fish fauna of the Krishna River system. Reported 57 fish species from the Indrayani River, a tributary of the

Bhima River (Salman R. C. *et al.,* 2013); 58 fish species from Koyna tributary which is a major tributary of Krishna, which joins it at Karad City (Das B. K. *et al.,* 2013) and 51 fish species from Krishna River at Wai and Dhom reservoir in Maharashtra (Shindhe S. E. *et. al.,* 2009).

(Table 3) shows fish species richness and various diversity indices. It is observed that, in present study species abundance was 394, Shannon - Weiner Index (H) recorded 3.351. The Simpson's Dominance Index (D) was recorded 0.03896 and the Simpson's Index of Diversity (1-D) was recorded 0.961. The Evenness_e^H/S 0.7923.

Table 3: The Fish Species Richness and Diversity Indices

S/N	Index	Value
01	Species Richness	36
02	Species abundance (N)	394
03	Shannon - Weiner Index (H)	3.351
04	Simpson's Dominance Index (D)	0.03896
05	Simpson's Index of Diversity (1-D)	0.961
06	Pielou's evenness (J)	0.7923

In the study it is also noticed that indiscriminate harvesting of fishes from their natural habitat is regularly done by rural people, which may lead to a serious decline of fish population.

Through interviewing local people it also suggests that some commercial and economically important fishes which are high market value are at present in very threatened condition.

CONCLUSIONS

The present study focused on fish species richness of Gugal Bridge cum barrage. Due to multiple use of fisheries resources, fishing has become a major industry and large number of aquatic communities are under a big threat of extinction. Thus, some awareness steps and programme is needed to educate people about the importance of river, fishes and its biodiversity.

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